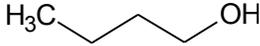
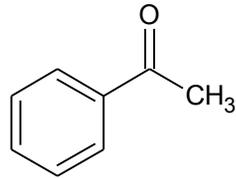
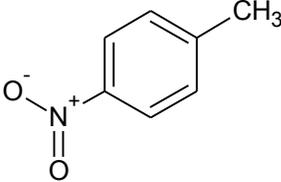
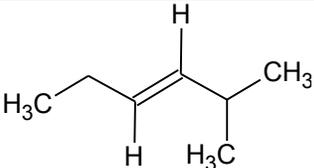
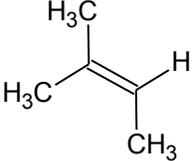
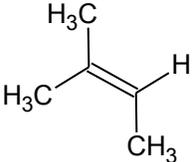
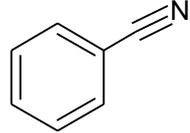
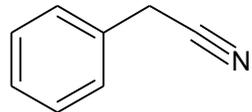
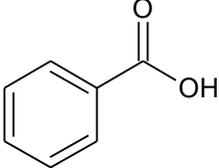
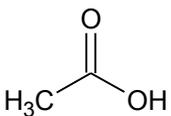
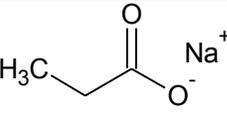
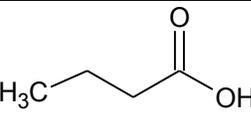
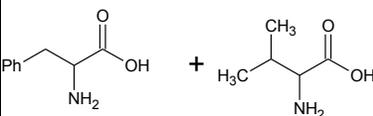
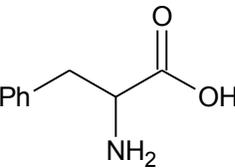
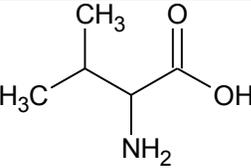
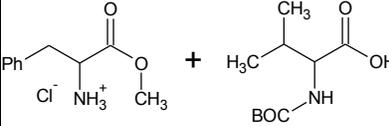


1	Oxidation of Primary Alcohol		$\xrightarrow[\text{K}_2\text{Cr}_2\text{O}_7, \text{H}^+]{\text{Jones Reagent or}}$	
2	Oxidation of Aldehydes		$\xrightarrow[\text{K}_2\text{Cr}_2\text{O}_7, \text{H}^+]{\text{Jones or}}$	
3	Oxidative Cleavage of Aryl Benzenes		$\xrightarrow[\text{H}_2\text{O}, 95\text{ }^\circ\text{C}]{\text{KMnO}_4}$	
4	Oxidative Cleavage of Alkenes		$\xrightarrow[\text{Acid}, \Delta]{\text{KMnO}_4}$	
5	Oxidative Cleavage of Alkenes		$\xrightarrow[\text{2. Zn, AcOH}]{\text{1. O}_3}$	
6	Oxidative Cleavage of Alkenes		$\xrightarrow[\text{2. H}_2\text{O}_2]{\text{1. O}_3}$	
7	Hydrolysis of Nitriles (Base Catalyzed)		$\xrightleftharpoons[\text{2. H}_3\text{O}^+]{\text{1. NaOH, H}_2\text{O}, \Delta}$	
8	Hydrolysis of Nitriles (Acid Catalyzed)		$\xrightleftharpoons[\text{H}_2\text{O}]{\text{H}_2\text{SO}_4}$	

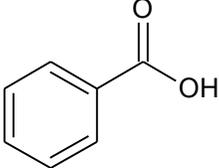
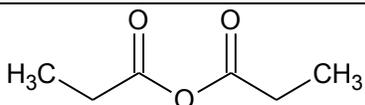
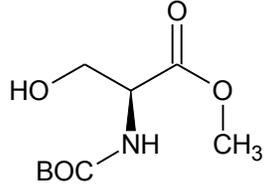
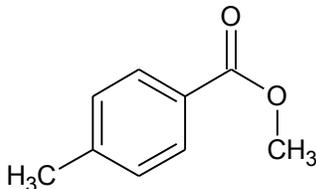
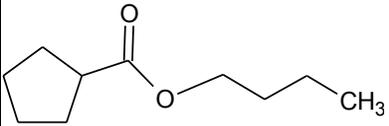
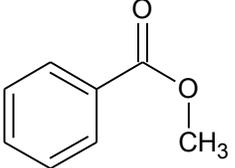
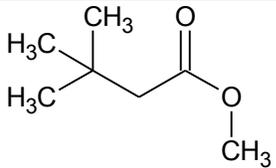
9	Carboxylation of Grignard Reagents		$\xrightarrow[2. H^+]{1. CO_2}$	
10	Carboxylation of Grignard Reagents		$\xrightarrow[2. H_2SO_4, H_2O]{1. NaCN, DMF}$	
11	Carboxylation of Grignard Reagents		$\xrightarrow[3. H^+]{1. Mg, THF, 2. CO_2}$	
12	Prep. Of Nitriles from Alkyl halides/ good L.G.		$\xrightarrow[DMSO]{NaCN}$	
13	Prep. Of Nitriles from Carbonyls		\xrightarrow{HCN}	
14	Prep. Of Nitriles from Amides		$\xrightarrow[80 \text{ } ^\circ\text{C}]{SOCl_2, benzene}$	
15	LAH Red'n of Nitriles		$\xrightarrow[2. H_3O^+]{1. LAH, ether}$	
16	Grignard Rxn of Nitriles		$\xrightarrow[2. Dilute HCl]{1. PhMgBr, THF}$	

17	Formation of Acid Chlorides from Carboxylic Acids		$\xrightarrow[\text{CHCl}_3]{\text{SOCl}_2}$	
18	Formation of Acid Anhydrides from -COOH	2 	$\xrightarrow{800\text{ }^\circ\text{C}}$	
19	Formation of Esters from -COOH (S _N 2)		$\xrightarrow{\text{CH}_3\text{I}}$	
20	Fischer Esterification (1985—Nobel prize 1902)		$\xrightleftharpoons[\text{HCl}]{\text{H}_3\text{C}-\text{CH}_2-\text{OH}}$	
21	Formation of Amides from -COOH		$\xrightarrow{\hspace{2cm}}$	
22	Formation of Amides from -COOH (methyl ester protecting group)		$\xrightarrow{\text{CH}_3\text{OH}, \text{HCl}}$	
23	Formation of Amides from -COOH (Boc protecting group)		$\xrightarrow[\text{CH}_2\text{Cl}_2]{\text{Boc}_2\text{O}, \text{TEA}}$	
24	Peptide Formation		$\xrightarrow[\text{DMAP}]{\text{DCC}}$	

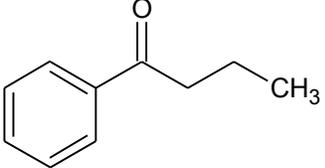
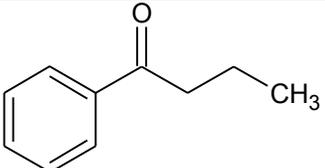
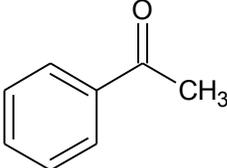
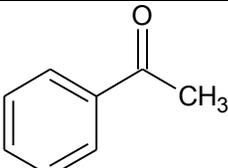
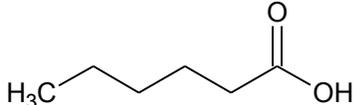
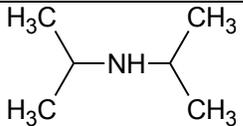
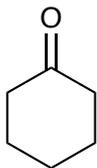
25	Deprotection (methyl ester removal)		$\xrightarrow{\text{LiOH, H}_2\text{O}}$	
26	Deprotection (Boc removal)		$\xrightarrow{\text{TFA}}$	
27	Formation of Alcohols		$\xrightarrow[2. \text{H}_3\text{O}^+]{1. \text{LAH}}$	
28	Prep. Of Acid Halides		$\xrightarrow[\text{Pyr}]{\text{SOCl}_2}$	
29	Prep of Acid Halides		$\xrightarrow[\text{Ether}]{\text{PBr}_3}$	
30	Hydrolysis of Acid Halides		$\xrightarrow{\text{H}_2\text{O}}$	
31	Formation of anhydrides from acid halides		$\xrightarrow[25\text{ }^\circ\text{C}]{\text{ether}}$	
32	Formation of Esters from acid halides (alcoholysis)		$\xrightarrow[\text{Pyr.}]{\text{Pyridine}}$	

33	Formation of Amides			
34	Hydride Red'n of Acid Halides			
35	Hydride Red'n of Acid Halides			
36	Grignard Reagents with Acid Chlorides			
37	Gilman Reagent with Acid Chlorides			
38	Friedel-Crafts Acylation of Acid Chlorides			
39	Prep of Acid Anhydrides			
40	Prep of Cyclic Acid Anhydrides			

41	Prep of Cyclic Acid Anhydrides		$\xrightarrow{\Delta}$	
42	Hydrolysis of Acid Anhydrides		$\xrightarrow{\text{H}_2\text{O}}$	
43	Ester Formation from Anhydrides		$\xrightarrow[\text{NaOH, H}_2\text{O}]{\text{H}_3\text{C-CO-O-CO-CH}_3}$	
44	Amide formation from Anhydrides		$\xrightarrow[\text{NaOH, H}_2\text{O}]{\text{H}_3\text{C-CO-O-CO-CH}_3}$	
45	Friedel-Crafts Acylation of Anhydrides		$\xrightarrow[\text{AlCl}_3]{\text{H}_3\text{C-CO-O-CO-CH}_3}$	
46	Friedel-Crafts Acylation of Cyclic Anhydrides		$\xrightarrow[\text{AlCl}_3]{\text{succinic anhydride}}$	
47	Prep of Esters		$\xrightarrow{\text{H}_3\text{C-CH}_2\text{-OH}}$	+ HCl

48	Prep of Esters		$\xrightleftharpoons{\text{CH}_3\text{OH}, \text{H}^+}$	
49	Prep of Esters		$\xrightarrow{\text{H}_3\text{C}-\text{CH}_2-\text{OH}, \text{H}^+}$	
50	Hydrolysis of esters (base catalyzed) (saponification)		$\xrightarrow[2. \text{H}_3\text{O}^+]{1. \text{LiOH}, \text{H}_2\text{O}}$	
51	Hydrolysis of Esters (Acid Catalyzed)		$\xrightleftharpoons{\text{H}_3\text{O}^+}$	
52	Transesterification of Esters		$\xrightleftharpoons{\text{CH}_3\text{OH}, \text{H}^+, \text{OH}^-}$	
53	Amide formation from Esters		$\xrightarrow{\text{H}_3\text{C}-\text{CH}_2-\text{NH}_2}$	
54	Alcohol Formation from Esters		$\xrightarrow[2. \text{H}_3\text{O}^+]{1. \text{LAH}}$	

55	Alcohol Formation from Esters		$\xrightarrow[2. \text{ Dilute HCl}]{1. \text{ PhMgBr, THF}}$	
56	Selective Red'n of Esters		$\xrightarrow[2. \text{ H}_3\text{O}^+]{1. \text{ DIBAL-H, } -78^\circ\text{C}}$	
57	Formation of Lactones from Esters		$\xrightleftharpoons{\text{H}^+}$	
58	Prep of Amides		$\xrightarrow[\Delta]{\text{H}_3\text{C}-\text{CH}_2-\text{NH}_2}$	
59	Prep of Amides		$\xrightarrow[2 \text{ Equivalents}]{\text{Cyclohexyl-NH}_2}$	
60	Prep of Amides		$\xrightarrow{\text{H}_3\text{C}-\text{CH}_2-\text{NH}-\text{CH}_3}$	
61	Hydrolysis of Amides		$\xrightarrow[\Delta]{\text{H}_3\text{O}^+ \text{ or } \text{OH}^-}$	
62	Red'n of Amides		$\xrightarrow[2. \text{ H}_3\text{O}^+]{1. \text{ LAH}}$	
63	Formation of Lactams from Amides		$\xrightarrow{\Delta}$	

64	Acid Catalyzed keto-enol tautomerization		$\xrightleftharpoons{\text{HCl}}$	
65	Base Catalyzed keto-enol tautomerization		$\xrightleftharpoons{\text{OH}^-}$	
66	Acidic α -halogenation of CHO/ketones		$\xrightarrow[\text{ether}]{\text{H}^+, \text{Br}_2}$	
67	Basic α -halogenation of CHO/ketones		$\xrightarrow[\text{ether}]{\text{OH}^-, \text{Br}_2}$	
68	α -halogenation of carb. Acids		$\xrightarrow[2. \text{H}_2\text{O}]{1. \text{Br}_2, \text{PBr}_3}$	
69	LDA Formation		$\xrightarrow[\text{THF}]{\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{Li}}$	
70	Rxn of Enolates		$\xrightarrow[2. \text{H}_3\text{C}-\text{CH}_2-\text{Br}]{1. \text{LDA, THF, } -78^\circ\text{C}}$	